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United States Environmental Protection Agency Region IX

75 Hawthorne St., WTR-6

San Francisco, CA 94105

June 11, 2014

Dear Sir or Madam:

I am writing for your expert opinion regarding arsenic exposure. These were my circumstances and the symptoms that followed:

- I was incarcerated at Kern Valley State Prison (KVSP) between 2009 and 2011.
- KVSP's water wells were contaminated with arsenic between .012 - .023 mg/L range.
- I showered, inhaled the contaminated water's misty form, and rinsed my mouth daily after brushing.
- I ate foods prepared with the contaminated water daily (i.e. potato flakes and steamed frozen vegetables)
- I drank tea or coffee and consumed soups made from the contaminated water daily.
- I developed small warts/corns on my palms and a blood test or two revealed that I had a low lymphocyte count. The physician also quoted me saying that I felt drained or fatigued.

The questions that arise from the exposure are:

- Can arsenic pass through one's skin in or out of the presence of open pores provided by heated water?
- Can arsenic enter the bloodstream through rinsing with contaminated water to have it pass through the gumline?
- Can arsenic be inhaled in its mist-form and enter the bloodstream through the lungs?
- Is it possible to poison someone without detection by slowly exposing them to arsenic?

Thank you for your time and support.

Yours truly,

Mr. A. T. Nguyen



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street, WTR-6

San Francisco, CA 94105

18 June 2014

Mr. Anthony T. Nguyen  
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Dear Mr. Johnson:

Thank you for your letter of 11 June, 2014, asking about possible health effects from your drinking water when you at the Kern Valley State Prison in Delano. You had some specific questions about whether you can get exposed to arsenic through your skin, by rinsing your mouth, or by inhalation of mists while showering. You also wanted to know about long-term poisoning by low levels of arsenic.

I'll try to answer your question about the effects of drinking water with arsenic in it in two parts: what arsenic does to people, and what you can expect from drinking water with arsenic at the levels you got at KVSP.

With respect to arsenic, if you consume enough of it, it is definitely a poison and has several adverse physiological effects. At high enough levels (about 100-200 milligram (mg, 1/1000<sup>th</sup> of a gram)), it stops mitochondrial respiration, your cells can't generate energy, and they (and you) die. This is what is meant by acute toxicity. In addition, arsenic appears to cause oxidative damage and stimulates the formation of a variety of physiological stress-related proteins. At lower levels, if ingested chronically over a longer time (1-10 mg per day or so for months or years), this still goes on, but not enough to kill you outright. However, your system may be weakened to the point that it isn't as effective at fighting off other kinds of cellular damage, which can build up and lead to other problems. Adverse health effects may occur only after years of exposure to these lower levels. Some of these include circulatory, neurological and liver problems. For example, a variety of skin diseases (hyperkeratoses, blackfoot, hyperpigmentation) are known to occur at levels starting around 0.1-0.2 mg per day. Arsenic also has hormonal effects that can cause diseases such as diabetes. These appear to happen even at much lower levels, perhaps less than 0.1 mg per day.

Arsenic is also a known human carcinogen. It appears to cause broken and missing chromosomes and other chromosomal abnormalities. It can cause lung, bladder, and skin cancers, and may cause liver, kidney and prostate cancers. Elevated cancer levels are seen in groups of people drinking water with arsenic levels of 0.1-0.2 mg per liter, which is about 0.2-0.4 mg per day. It usually takes many years of drinking water at these levels for cancers to



occur. At higher levels (0.5-1.0 mg per day), these cancers can form faster.

Fortunately, you weren't getting that much arsenic in the KVSP drinking water. The levels of arsenic in the drinking water at KVSP were around 0.012-0.023 mg per liter, slightly above our Maximum Contaminant Level of 0.010 mg per liter. If you consume 2 liters of water a day by drinking it or from eating food cooked in this water, you get about 0.030-0.040 mg per day of arsenic. It may be a bit of a comfort that medical studies don't show much, if any, disease being caused by arsenic at these levels.

You mentioned that you developed small warts or corns on you palms and that a blood test showed low lymphocyte levels. While a physician should be consulted on these issues, arsenic isn't known to be associated with them.

I hope that this addressed your concerns. If not, or if you have more questions, you can reach me at the above address, or at 415 972-3569.

Sincerely,

Bruce A. Macler, PhD  
Regional Toxicologist  
Drinking Water Program